

Remarks

Claim Status

Originally filed claims 1 - 46 were reviewed by the Examiner. The Examiner rejected originally filed claims 1-46 under 35 U.S.C. §112, second paragraph; rejected originally filed claims 1-7, 15-19 and 30-32 under 35 U.S.C. §102(b) and rejected originally filed claims 1-2, 4-8, 11-13, 21-28, and 30 - 46 under 35 U.S.C. §103(a). Claims 1, 13, 15, 18, 19, 20, 21, 30, 43, 44, 45, and 46 have been amended. Claims 1 - 46, as amended, are pending.

Claim Rejections

Section 112 Claim Rejections

In the first Section of the Examiner's Detailed Action under the heading ***Claim Rejections – 35 U.S.C. §112***, the Examiner rejected originally filed Claims 1 – 46 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Examiner specifically identified terms in claims 13, 15, 18 – 20, 30 and 44 – 46 that were the basis for the Section 112 rejection. By the proposed amendments to claims 13, 15, 18 - 20, 30 and 44 - 46 made herein, Applicants submit that Claims 1 – 46, as now amended, are believed to recite Applicants' invention with the requisite specificity and definiteness.

Specifically, in Claim 13 as amended, the "at least one hoop wound fiber" has been amended to read --at least one circumferential fiber-- as the element is recited in Claim 1. In Claims 15 and 18-20, "substantially" has been deleted from each Claim. In Claim 30, as now amended, the "at least one fiber" now is recited to surround -- a central axis --. In Claim 44, as amended, the longitudinal fiber extends along a defined longitudinal axis. In Claim 46 the Claim has been amended to recite a lateral shim where the lateral shim surrounds the outside of the shim. The lateral shim is disclosed in Figure 10C and on Page 12, lines 12 -15.

No new matter is introduced by any of the amendments to the Claims. Applicants

submit that Claims 1 - 46, as amended now recite Applicants' invention with the definiteness required under Section 112. Entry of the proposed amendments to the Claims and withdrawal of the Section 112 rejection of Claims 1 - 46 are respectfully requested.

Section 102(b) Claim Rejections

In the second Section of the Examiner's Detailed Action under the heading ***Claim Rejections – 35 U.S.C. §102***, the Examiner rejected originally filed Claims 1 - 7, 15 - 19 and 30 - 32 as being anticipated by Dudek U.S. Patent No. 3, 869, 113 under 35 U.S.C. §102(b).

It is well established that to anticipate under 35 U.S.C. §102, a single prior art reference must disclose all the elements and relationships of the claimed invention. Unless a single prior art reference discloses all of the same claimed elements in exactly the same situation united in the same way to perform the same function, there can be no anticipation as a matter of law. Applicant submits that the Dudek '113 reference does not disclose all of the elements and relationships of Applicants' invention as now claimed and therefore, claims 1 - 7, 15 - 19 and 30 - 32 as amended are believed to be patentable over the Dudek reference that forms the basis of the Examiner's rejections under Sections 102(b).

Specifically the Dudek reference does not disclose Applicants' composite shim as now generally claimed where the composite shim comprises ***a central axis*** and the composite shim has a laminate structure comprising a first composite layer including at least one circumferential fiber ***where the at least one circumferential fiber is located in a plane that is perpendicular to the central shim axis***.

The Dudek '113 reference discloses a bushing comprising inner and outer rigid members joined by a cylindrical spiral layer comprised of an elastomer - fabric composite. The elastomer - fabric composite includes discrete cords 14 embedded in the elastomer. The spiral portion of elastomer - fabric is wound as a unitary member about its outer surface to form cylindrical convolution 16. As wound in the spiral member 16,

the discrete cords are oriented longitudinally and parallel to the central bushing axis. The characteristic number of spiral windings are used to control the spring rate parameters of the bushing. The bushing includes a resilient portion between the rigid portions where the integral resilient portion is comprised of a combination of a plurality of spiral turns having flexible fiber cords in the elastomer. In summary, the Dudek reference teaches a bushing with inner and outer rigid tubular members and a resilient spiral cylindrical layer therebetween. The rigid and resilient layers of the Dudek bushing have an axially extending, cylindrical configuration with the cords of each layer being parallel and extending substantially longitudinally along the height of the cylindrical shim.

The Dudek reference does not teach or suggest Applicants' invention as now claimed. Specifically, the Dudek reference does not teach or suggest a composite shim with a central axis and a circumferential fiber extending in a plane that is substantially perpendicular to the central axis. Because the Dudek reference does not disclose or suggest all of the same claimed elements in exactly the same situation united in the same way to perform the same function as now claimed by Applicants, there can be no anticipation under 35 U.S.C. §102(b) as a matter of law. Accordingly, Applicants respectfully request reconsideration, withdrawal of the Section 102 rejection of claims 1 - 7, 15 - 19 and 30 - 32 and allowance of amended claims 1 - 7, 15-19 and 30-32 as now amended.

Section 103 Claim Rejections

In the third Section of the Examiner's Detailed Action under the heading ***Claim Rejections – 35 U.S.C. §103***, the Examiner rejected originally filed Claims 1 – 2, 4-8, 11-13, 21-28, and 30 – 46 under Section 103(a).

The Examiner rejected Claims 1-2, 4-8 and 11-13 under 35 U.S.C. §103(a) as being unpatentable over Dudek Patent No. 3,869,113 in view of Williams U.S. Patent No. 5,363,929.

The Examiner rejected Claims 21 - 25 under 35 U.S.C. §103(a) as being

unpatentable over Clinard, Jr. U.S. Patent No. 4,108,508 in view of Dudek U.S. Patent No. 3, 869, 113.

The Examiner rejected Claims 21 - 28 under 35 U.S.C. §103(a) as being unpatentable over Clinard, Jr. U.S. Patent No. 4,108,508 in view of Dudek U.S. Patent No. 3, 869, 113, further in view of Williams et al. U.S. Patent No. 5, 363, 929.

The Examiner rejected Claims 30-36, 38 and 40 under 35 U.S.C. §103(a) as being unpatentable over Dudek U.S. Patent No. 3, 869, 113 in view of Williams et al. U.S. Patent No. 5, 363, 929.

The Examiner rejected Claims 30, 33, 37 and 39 under 35 U.S.C. §103(a) as being unpatentable over Dudek U.S. Patent No. 3, 869, 113 in view of Williams et al. U.S. Patent No. 5, 363, 929 in further view of Hatch U.S. Patent No. 4, 207, 778.

The Examiner rejected Claims 30 and 41-44 under 35 U.S.C. §103(a) as being unpatentable over Dudek U.S. Patent No. 3, 869, 113 in view of Clinard, Jr. U.S. Patent No. 4, 108, 508.

The Examiner rejected Claims 30 and 42 - 45 under 35 U.S.C. §103(a) as being unpatentable over Dudek U.S. Patent No. 3, 869, 113 in view of Hatch U.S. Patent No. 4, 207, 778.

The Examiner rejected Claims 30, 42-44 and 46 under 35 U.S.C. §103(a) as being unpatentable over Dudek U.S. Patent No. 3, 869, 113 in view of Hatch U.S. Patent No. 4, 207, 778.

Summary of the Prior Art that Forms the Basis of Section 103 Rejections

The Examiner relied on the teachings of the Dudek '113; Williams '929, Hatch '778 and Clinard '508 U.S. patents to form the basis of all of the Section 103 rejections of the Claims 1 - 2, 4-8, 11-13, 21-28, and 30 - 46.

The teachings of the Dudek '113 reference were discussed in connection with the Remarks in response to the Section 102 rejections hereinabove. In summary, the Dudek

reference discloses a cylindrical bushing member with a central longitudinal axis and concentric rigid inner and outer hollow cylindrical members. An elastomeric member joins the inner and outer members. The elastomeric member has a spiral configuration with a plurality of cord members embedded in the elastomer. The cord members are spaced along the elastomer and extend longitudinally, parallel to the central longitudinal axis.

The Williams '929 reference discloses a number of embodiments of elongate torque shaft 41, 141 and 241. The torque shaft joins the rotor 22 and the bearing set 31 and thereby provides the mechanical link between the downhole fluid motor 20 and the drill bit 30. The torque shaft includes a plurality of elongate layers 51 – 55 (151-155 and 251-253, 255 and 257) and the layers may comprise longitudinally extending layers with fibers that are oriented at varying relative angles. The fibers extend uninterrupted between the layer ends. The Williams '929 references does not disclose a composite shim with a first composite layer having a circumferential fiber around the central shim axis. Where the fiber extends in a plane parallel to the central axis.

The Clinard, Jr. '508 reference discloses a laminated bearing comprised of alternating layers of elastomeric and nonextensible material. The Clinard, Jr. reference does not disclose a composite shim or nonextensible member, having a fiber member provided in the shim. The laminated bearing comprises a frustoconical shape.

The Hatch '778 reference discloses a reinforced cross ply composite flywheel. The flywheel disclosed in the Hatch reference comprises a body comprised of a cross ply composite central portion comprising a plurality of fiber containing layers identified as 30, 40, 50, 60, 70 and 80. A rim along the outer periphery of the flywheel fiber containing layers surrounds the layers and the rim is made from a material comprising a relatively low density-to-stiffness ratio. The Hatch reference only discloses chordally extending fibers. The fibers of successive layers are oriented at angles of between 70° and 110° relative to the angle of the fibers of the preceding layer. No circumferential fibers are suggested or taught by Hatch.

None of the references relied on by the Examiner disclose a laminate shim structure with a central axis and a first composite shim layer that further comprises a circumferential fiber oriented perpendicular to the central axis, as now claimed by Applicants. The circumferential fiber extending in a single plane perpendicular to the central axis is not taught or suggested in any of the references relied upon by the Examiner which form the basis of the Section 103 Claim rejections. The references disclose *interalia* elongate multilayer members where the members comprise fibers or cords that are oriented in a variety of relative directions. The fibers/cords are not oriented circumferentially in a plane perpendicular to the central axis. Fibers may be oriented chordally/uniaxially. Applicants' invention as now claimed in independent claims 1, 21 and 30, generally comprises a first composite shim layer with a circumferentially extending fiber where the circumferential fiber is located in a plane perpendicular to the central axis. The composite shim with the circumferentially extending fiber is located among layers with uniaxially or chordally extending fibers. In this way the shim of Applicants' invention introduces a further fiber discontinuity among the layers.

Because none of the prior art references discloses or teaches a composite shim with a circumferential fiber that extends in a plane perpendicular to the shim central axis, even if it were obvious to make any of the combinations of references recited by the Examiner in the Detailed Action, such combinations still would not produce Applicants' invention as now claimed in claims 1-2, 4-8, 11-13, 21-28, and 30 - 46 as amended. Therefore Applicants respectfully submit that Claims 1 - 2, 4-8, 11-13, 21-28, and 30 - 46, as amended, are believed to be allowable and all the claims that depend therefrom are also believed to now be allowable. Accordingly, Applicants respectfully request withdrawal of the Section 103 rejection of Claims 1 - 2, 4-8, 11-13, 21-28, and 30 - 46 and formal allowance of these Claims, as amended.

Miscellaneous

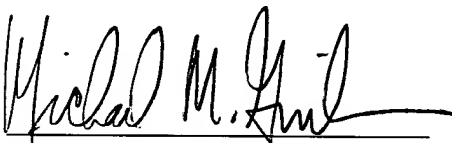
A marked up version of claims 1, 13, 15, 18, 19, 20, 21, 30, 43, 44, 45, and 46 showing the proposed changes to the claims is enclosed beginning on a separate sheet.

A clean version of claims 1, 13, 15, 18, 19, 20, 21, 30, 43, 44, 45 and 46 incorporating the proposed changes along with the remaining unchanged claims has also been attached beginning on a separate sheet.

Examiner is authorized to charge deposit account 12-2143 the amount required for a three-month extension of time for filing a response to the Office Action.

In light of the amendments and Remarks herein, Applicant submits that claims 1 - 46 as amended are in condition for allowance. Reconsideration and withdrawal of the claim rejections and allowance of the amended claims 1 - 46 are respectfully requested.

Respectfully submitted,



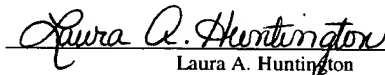
Michael M. Gnibus

Attorney for Applicant
Reg. No. 38,162
919-468-5979 ext. 6205
Lord Corporation
111 Lord Drive
Cary, North Carolina 27511

Certificate of Express Mail under 37 CFR §1.10

I hereby certify that the above identified Amendment and Request for Reconsideration (along with any paper referred to as being attached or enclosed) entitled "*Composite Shims Having A Laminate Structure*" is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" under 37 CFR 1.10 on August 13, 2002, and is addressed to Assistant Commissioner for Patents, Washington, DC 20231.

Signed


Laura A. Huntington

Date

August 13, 2002

Express Mail No.

EV132159388US

Version With Markings to Show Changes Made

In accordance with 37 C.F.R. 1.121(c) the following versions of the claims are rewritten by the foregoing amendments to show all the changes made relative to the previous versions of the claims. In the following claims originally presented text to be deleted is bracketed and text to be inserted is underlined.

1. **(Amended)** A composite shim having a laminate structure, the composite shim having a central axis, the composite shim comprising a first composite layer including at least one circumferential fiber, said circumferential fiber being oriented in a plane that is substantially perpendicular to said central axis.

13.**(Amended)** A composite shim according to Claim 1, wherein the at least one [hoop wound] circumferential fiber is selected from the group consisting of carbon, graphite, glass, aramid and boron.

15.**(Amended)** A composite shim having a laminate structure comprising a central axis and a first composite layer including at least one [a] fiber that [is substantially concentrically oriented] surrounds the central axis and is located in a single plane.

18.**(Amended)** A composite shim according to Claim 15, wherein the first composite layer comprises a plurality of fibers that are [substantially] concentrically oriented.

19.**(Amended)** A composite shim according to Claim 18, wherein the plurality of fibers that are [substantially] concentrically oriented are arcuate shaped fibers.

20.**(Amended)** A composite shim according to Claim 19, wherein the plurality of arcuate shaped fibers form a plurality of circles oriented as [substantially] concentric rings.

21.**(Amended)** A laminated bearing structure comprising:
a plurality of resilient layers; and

a plurality of shims alternating with and laminated to the plurality of resilient layers, wherein at least one of the shims is a composite shim having a central axis and a laminate structure comprising a first composite layer including at least one circumferential fiber in a plane that is substantially perpendicular to said central axis.

30.(**Amended**) A composite shim having a laminate structure comprising a central axis and a first composite layer including at least one fiber that surrounds [a section] the central axis of the first composite layer circumferentially in a direction that is perpendicular to said central axis.

43. (**Amended**) A composite shim according to Claim 42 wherein the shim has [an axis, the at least one] a plurality of fibers surrounding the central axis.

44. (**Amended**) A composite shim according to Claim 43 wherein the central axis is a longitudinal axis, the composite shim further comprising[es] at least one longitudinal fiber and the at least one longitudinal fiber being oriented in the direction defined by the longitudinal axis.

45. (**Amended**)A composite shim according to Claim 4[4]2 wherein the shim further comprises at least one [longitudinal] fiber that extends [diametrically] circumferentially.

46. (**Amended**)A composite shim according to Claim 44 wherein the shim further comprises at least one longitudinal fiber and at least one lateral fiber that extend[s] around the [outside of the] outer periphery of the shim.

Submission of a Clean Version of the Entire Set of Pending Claims

In accordance with 37 C.F.R. §1.121(c)(3) Applicants submit herewith a clean version of the claims as amended hereinabove.

1. **(Amended)** A composite shim having a laminate structure, the composite shim having a central axis, the composite shim comprising a first composite layer including at least one circumferential fiber, said circumferential fiber being oriented in a plane that is substantially perpendicular to said central axis.

2. A composite shim according to Claim 1, wherein the laminate structure further comprises a second composite layer including a plurality of axial fibers, and wherein the first composite layer has a first side and a second side opposite the first side and the second composite layer has a first side and a second side opposite the first side, and wherein the first side of the first composite layer is laminated to the first side of the second composite layer.

3. A composite shim according to Claim 2, wherein the laminate structure further comprises a third composite layer including at least one circumferential fiber, and wherein the third composite layer is laminated to the second side of the second composite layer.

4. A composite shim according to Claim 2, wherein the laminate structure further comprises a third composite layer including a plurality of axial fibers and wherein the third composite layer is laminated to the second side of the first composite layer.

5. A composite shim according to Claim 4, wherein the second composite layer comprises a plurality of laminated composite sublayers, and wherein the third composite layer comprises a plurality of laminated composite sublayers.

6. A composite shim according to Claim 5, wherein the composite sublayers

X
A
44
B
Bt

of the second and third composite layers include uniaxial fibers.

7. A composite shim according to Claim 6, wherein the uniaxial fibers of each of the composite sublayers of the second and third composite layers are oriented along an axis defining an axis of each of the composite sublayers, and wherein the composite sublayers are arranged such that the axes of adjacent composite sublayers are offset by an angle.

8. A composite shim according to Claim 7, wherein the second composite layer includes at least four composite sublayers, and wherein the third composite layer includes at least four composite sublayers.

9. A composite shim according to Claim 8, wherein the four composite sublayers of the second composite layer are arranged such that their respective axes are in a 0°, +45°, -45°, and 90° orientation, and wherein the four composite sublayers of the third composite layer are arranged such that their axes are in a 90°, -45°, +45°, and 0° orientation.

10. A composite shim according to Claim 4, wherein the second composite layer includes a layer selected from the group consisting of biaxial and triaxial woven cloth, and wherein the third composite layer comprises a layer selected from the group consisting of biaxial and triaxial woven cloth.

11. A composite shim according to Claim 1, wherein the first composite layer further includes a polymeric material.

12. A composite shim according to Claim 11, wherein the polymeric material comprises epoxy.

13.(Amended) A composite shim according to Claim 1, wherein the at least one circumferential fiber is selected from the group consisting of carbon, graphite, glass,

2
43
B3

aramid and boron.

14. A composite shim according to Claim 1, wherein the composite shim has a thickness between about 0.01 inches to about 0.5 inches.

15.(Amended) A composite shim having a laminate structure comprising a central axis and a first composite layer including at least one fiber that surrounds the central axis and is located in a single plane.

16. A composite shim according to Claim 15, wherein the laminate structure further comprises a second composite layer laminated to the first composite layer, wherein the second composite layer includes a plurality of axial fibers.

17. A composite shim according to Claim 16, wherein the second composite layer comprises a plurality of laminated composite sublayers.

18.(Amended) A composite shim according to Claim 15, wherein the first composite layer comprises a plurality of fibers that are concentrically oriented.

19.(Amended) A composite shim according to Claim 18, wherein the plurality of fibers that are concentrically oriented are arcuate shaped fibers.

20.(Amended) A composite shim according to Claim 19, wherein the plurality of arcuate shaped fibers form a plurality of circles oriented as concentric rings.

21.(Amended) A laminated bearing structure comprising:
a plurality of resilient layers; and
a plurality of shims alternating with and laminated to the plurality of resilient layers, wherein at least one of the shims is a composite shim having a central axis and a laminate structure comprising a first composite layer including at least one circumferential fiber in a plane that is substantially perpendicular to said central axis.

22. A laminated bearing structure according to Claim 21, wherein the composite shim having a laminate structure further comprises a second composite layer including a plurality of axial fibers, and wherein the first composite layer has a first side and a second side opposite the first side and the second composite layer has a first side and a second side opposite the first side, and wherein the first side of the first composite layer is laminated to the first side of the second composite layer.

23. A laminated bearing according to Claim 22, wherein the composite shim having a laminate structure further comprises a third composite layer including a plurality of axial fibers and wherein the third composite layer is laminated to the second side of the first composite layer.

24. A laminated bearing according to Claim 23, wherein the second composite layer comprises a plurality of laminated composite sublayers, and wherein the third composite layer comprises a plurality of laminated composite sublayers.

25. A laminated bearing according to Claim 24, wherein the composite sublayers of the second and third composite layers include uniaxial fibers.

26. A laminated bearing according to Claim 25, wherein the uniaxial fibers of each of the composite sublayers of the second and third composite layers are oriented along an axis defining an axis of each of the composite sublayers, and wherein the composite sublayers are arranged such that the axes of adjacent composite sublayers are offset by an angle.

27. A laminated bearing according to Claim 26, wherein the second composite layer includes at least four composite sublayers, and wherein the third composite layer includes at least four composite sublayers.

28. A laminated bearing according to Claim 27, wherein the four composite

sublayers of the second composite layer are arranged such that their respective axes are in a 0° , $+45^\circ$, -45° , and 90° orientation, and wherein the four composite sublayers of the third composite layer are arranged such that their axes are in a 90° , -45° , $+45^\circ$, and 0° orientation.

29. A laminated bearing according to Claim 21, wherein the composite shim has a thickness between about 0.01 inches to about 0.5 inches.

30.(Amended) A composite shim having a laminate structure comprising a central axis and a first composite layer including at least one fiber that surrounds the central axis of the first composite layer circumferentially in a direction that is perpendicular to said central axis.

31. A composite shim according to Claim 30 wherein the at least one fiber is circumferential.

32. A composite shim according to Claim 30 wherein the at least one circumferential fiber is comprised of a plurality of concentric circles.

33. A composite shim according to Claim 30 wherein the at least one circumferential fiber is comprised of a spiral.

34. A composite shim according to Claim 30 wherein the laminate structure further comprises a second composite layer including a plurality of axial fibers, and wherein the at least one circumferential fiber is comprised of a plurality of concentric circles.

35. A composite shim according to Claim 33 wherein the laminate structure includes a plurality of alternating first and second composite layers.

36. A composite shim according to claim 34 wherein the axial fibers are

oriented at angles, the orientation angles of axial fibers of consecutive layers being different.

37. A composite shim according to Claim 33 wherein the laminate structure further comprises a second composite layer including a plurality of radial fibers, and wherein the at least one circumferential fiber is comprised of a plurality of concentric circles.

38. A composite shim according to Claim 36 wherein the laminate structure includes a plurality of alternating first and second composite layers.

39. A composite shim according to Claim 30 further comprising at least one second composite layer comprising a plurality of radially extending fibers, and at least one third composite layer comprising a plurality of uniaxial fibers.

40. A composite shim according to Claim 38 wherein the shim includes a plurality of first, second and third composite layers.

41. A composite shim according to Claim 30 wherein the shim is frustoconical.

42. A composite shim according to Claim 30 wherein the shim is cylindrical.

43. **(Amended)** A composite shim according to Claim 42 wherein the shim has a plurality of fibers surrounding the central axis.

44. **(Amended)** A composite shim according to Claim 43 wherein the central axis is a longitudinal axis, the composite shim further comprising at least one longitudinal fiber and the at least one longitudinal fiber being oriented in the direction defined by the longitudinal axis.

45. **(Amended)** A composite shim according to Claim 42 wherein the shim

Handwritten notes: 7/10, 5/23, 3/19

AB
Cont'd
Sub B9

further comprises at least one fiber that extends circumferentially.

46. (**Amended**) A composite shim according to Claim 44 wherein the shim further comprises at least one longitudinal fiber and at least one lateral fiber that extend around the outer periphery of the shim.
